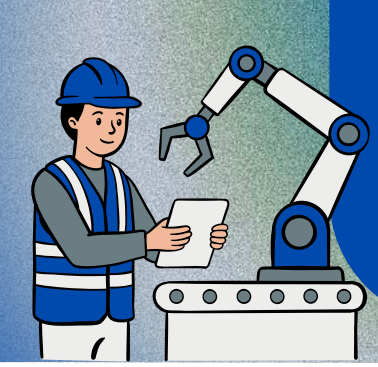

Overall Equipment Effectiveness (OEE) and MES Tracking Implementation Guide

Introduction

Overall Equipment Effectiveness (OEE) is a key performance metric used to evaluate how effectively manufacturing operations are utilised. When integrated with a Manufacturing Execution System (MES), OEE provides real-time visibility, data-driven insights, and opportunities for continuous improvement.

This guide provides a practical framework for implementing OEE tracking using MES systems.

Understanding OEE

OEE is composed of three main factors:

- **Availability** – Measures equipment uptime versus planned production time
- **Performance** – Measures speed losses compared to ideal cycle time
- **Quality** – Measures production of good parts versus total parts produced

OEE Formula

OEE = Availability × Performance × Quality

- **Availability = 90%**
- **Performance = 85%**
- **Quality = 95%**
- **OEE = 0.90 × 0.85 × 0.95 = 72.68%**

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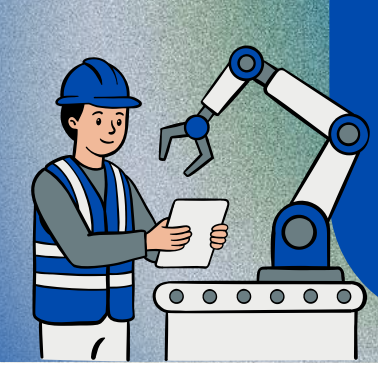


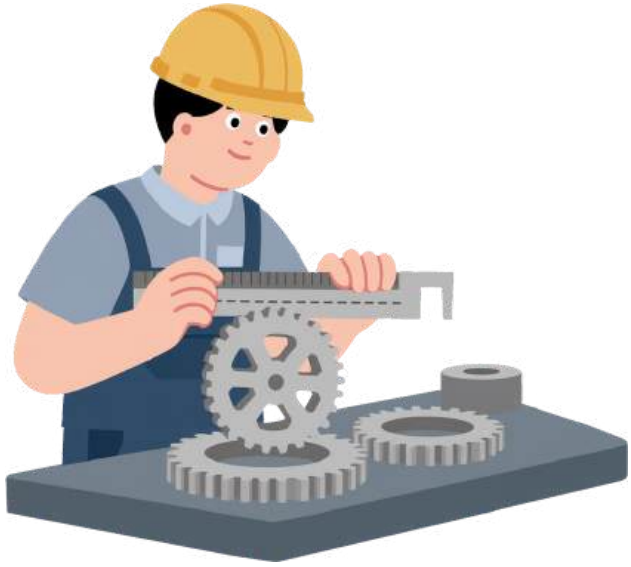
Overall Equipment Effectiveness (OEE) and MES Tracking Implementation Guide

MES and Its Role in OEE

A Manufacturing Execution System (MES) bridges the gap between shop floor operations and enterprise systems.

Key MES Functions for OEE:

- Real-time machine monitoring
- Production tracking
- Downtime tracking and classification
- Quality data collection
- Operator input interfaces
- Integration with ERP and SCADA systems



Implementation Architecture

Data Sources

- PLCs and machine controllers
- IoT sensors (vibration, temperature, counters)
- Manual operator inputs

Data Flow

- Machine signals captured via PLC/IoT
- Data transmitted to edge gateway or MES
- MES processes and stores data
- Dashboards visualise OEE metrics

System Components

- Edge devices / IoT gateways
- Communication protocols (OPC UA, MQTT)
- MES platform
- Database (SQL/Cloud)
- Visualisation dashboards

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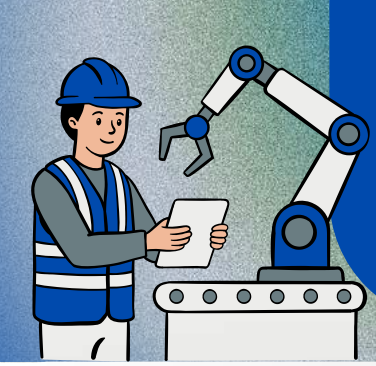

Overall Equipment Effectiveness (OEE) and MES Tracking Implementation Guide

Defining OEE Metrics in MES

Availability

- Planned Production Time
- Downtime (planned vs unplanned)
- Availability = (Operating Time / Planned Production Time)

Performance

- Ideal cycle time
- Actual production rate
- Performance = (Ideal Cycle Time × Total Count) / Operating Time

Quality

- Good units vs rejected units
- Quality = Good Count / Total Count

Downtime Management

Categories:

- Planned downtime (maintenance, changeovers)
- Unplanned downtime (failures, breakdowns)
- Micro-stoppages

Best Practices:

- Use standardised downtime codes
- Enable operator input for reason tagging
- Automate detection where possible

Data Collection Strategies

Automated Collection

- Machine counters
- Sensor-based monitoring

Manual Collection

- Operator tablets or HMIs
- Barcode/RFID input

Hybrid Approach

Combine automated signals with operator validation for accuracy.

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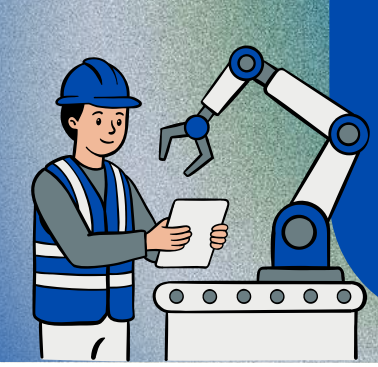

Overall Equipment Effectiveness (OEE) and MES Tracking Implementation Guide

Visualisation and Dashboards

Key Dashboards:

- Real-time OEE dashboard
- Machine-level performance
- Shift and daily reports
- Downtime Pareto charts

Visualisation Tools:

- MES built-in dashboards
- Power BI / Tableau
- Custom web dashboards

Integration with Enterprise Systems

ERP Integration

- Production orders
- Material tracking

SCADA Integration

- Real-time machine data

CMMS Integration

- Maintenance scheduling
- Failure tracking

Implementation Roadmap

Phase 1: Assessment
- Identify critical machines
- Define KPIs

Phase 2: Pilot Deployment
- Implement on selected production line
- Validate data accuracy

Phase 3: Scaling
- Roll out across the plant
- Standardize processes

Phase 4: Optimisation
- Continuous improvement
- Advanced analytics and AI

Challenges and Mitigation

Challenge	Mitigation
Data accuracy	Sensor calibration, validation rules
Operator resistance	Training, user-friendly UI
Integration complexity	Use standard protocols
Downtime misclassification	Standard taxonomy

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